

This Page Is Inserted by IFW Operations  
and is not a part of the Official Record

---

## **BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images may include (but are not limited to):

- BLACK BORDERS
- TEXT CUT OFF AT TOP, BOTTOM OR SIDES
- FADED TEXT
- ILLEGIBLE TEXT
- SKEWED/SLANTED IMAGES
- COLORED PHOTOS
- BLACK OR VERY BLACK AND WHITE DARK PHOTOS
- GRAY SCALE DOCUMENTS

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning documents *will not* correct images,  
please do not report the images to the  
Image Problem Mailbox.**

## PATENT COOPERATION TREATY

## PCT

## INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference H0888PCT/HdG/R	<b>FOR FURTHER ACTION</b> see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.	
International application No. PCT/NL 98/00051	International filing date (day/month/year) 23/01/1998	(Earliest) Priority Date (day/month/year) 23/01/1997
Applicant  HOOGO VENS STAAL B.V. et al.		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 4 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. ☐ Certain claims were found unsearchable (see Box I).

2. ☐ Unity of invention is lacking (see Box II).

3. ☐ The international application contains disclosure of a **nucleotide and/or amino acid sequence listing** and the international search was carried out on the basis of the sequence listing

☐ filed with the international application.

☐ furnished by the applicant separately from the international application,

☐ but not accompanied by a statement to the effect that it did not include matter going beyond the disclosure in the international application as filed.

☐ Transcribed by this Authority

4. With regard to the title, ☒ the text is approved as submitted by the applicant

☐ the text has been established by this Authority to read as follows:

5. With regard to the abstract,

☐ the text is approved as submitted by the applicant

☒ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this International Search Report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is:

Figure No. 1 ☒ as suggested by the applicant.

☐ None of the figures.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/NL 98/00051

## Box III TEXT OF THE ABSTRACT (Continuation of item 5 of the first sheet)

The following reference numbers have been added:  
In line 1: "...substrate (1) with a band (3)..."  
In line 4: "...roll (5, 5a)"  
In line 12: "...substrate (1) with the plastic band (3)..."

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 98/00051

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 B32B31/30 B32B15/08 B29C39/18

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 B32B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 407 702 A (SMITH DAVID A ET AL) 18 April 1995 see column 1, line 1 - column 4, line 38 see figures ---	1-10, 13
X	WO 93 24324 A (BASF LACKE & FARBEN ;KIRIAZIS LEONIDAS (DE)) 9 December 1993 see the whole document ---	1, 3, 5, 13
P, A	WO 97 32715 A (TOYO KOHAN CO LTD ;OKAMURA TAKAAKI (JP); OHHASHI YASUO (JP); NAKAM) 12 September 1997 see abstract; figures ---	1, 3
X	EP 0 067 060 A (TAIYO STEEL) 15 December 1982 see page 2, line 8 - page 4, line 19 see page 7, line 2 - line 11 --- -/--	6-10



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&amp;" document member of the same patent family

Date of the actual completion of the international search

14 April 1998

Date of mailing of the international search report

24/04/1998

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3016

Authorized officer

Lanaspeze, J

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 98/00051

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category °	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 095, no. 005, 30 June 1995 & JP 07 041744 A (HOKKAI CAN CO LTD), 10 February 1995, see abstract ---	11,12
A	PATENT ABSTRACTS OF JAPAN vol. 017, no. 591 (C-1125), 28 October 1993 & JP 05 177168 A (SUMITOMO METAL IND LTD), 20 July 1993, see abstract ----	11,12
A	WO 96 09169 A (EASTMAN CHEM CO) 28 March 1996 -----	

## INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 98/00051

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5407702 A	18-04-95	NONE	
WO 9324324 A	09-12-93	DE 4218369 A AT 158985 T AU 670096 B AU 4320793 A CA 2136746 A	09-12-93 15-10-97 04-07-96 30-12-93 09-12-93
		DE 59307521 D EP 0689505 A NO 944649 A ZA 9303713 A	13-11-97 03-01-96 02-12-94 15-12-93
WO 9732715 A	12-09-97	AU 5778896 A	22-09-97
EP 0067060 A	15-12-82	JP 1680842 C JP 3041342 B JP 57203545 A	13-07-92 21-06-91 13-12-82
WO 9609169 A	28-03-96	ZA 9508048 A	22-04-96

## PATENT COOPERATION TREATY

PCT

From the INTERNATIONAL BUREAU

## NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

United States Patent and Trademark  
Office  
(Box PCT)  
Crystal Plaza 2  
Washington, DC 20231  
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

<b>Date of mailing</b> (day/month/year) 05 October 1998 (05.10.98)	<b>Applicant's or agent's file reference</b> HO886PCT/HdG/R
<b>International application No.</b> PCT/NL98/00051	<b>Priority date</b> (day/month/year) 23 January 1997 (23.01.97)
<b>International filing date</b> (day/month/year) 23 January 1998 (23.01.98)	
<b>Applicant</b> BEENTJES, Petrus, Cornelis, Jozef	

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:  
20 August 1998 (20.08.98)

☐ in a notice effecting later election filed with the International Bureau on:  
\_\_\_\_\_

2. The election ☒ was

☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO  
34, chemin des Colombettes  
1211 Geneva 20, Switzerland

Facsimile No.: (41-22) 740.14.35

Authorized officer

Marie-José Devillard


Telephone No.: (41-22) 338.83.38

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>HO888PCT/HdG/R</b>		<b>FOR FURTHER ACTION</b>		See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
International application No. <b>PCT/NL98/00051</b>		International filing date (day/month/year) <b>23/01/1998</b>	Priority date (day/month/year) <b>23/01/1997</b>	
International Patent Classification (IPC) or national classification and IPC <b>B32B31/30</b>				
Applicant <b>HOOGOVS STAAL B.V. et al.</b>				
<p>1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 6 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 8 sheets.</p>				
<p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> <li>I <input checked="" type="checkbox"/> Basis of the report</li> <li>II <input type="checkbox"/> Priority</li> <li>III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</li> <li>IV <input type="checkbox"/> Lack of unity of invention</li> <li>V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</li> <li>VI <input checked="" type="checkbox"/> Certain documents cited</li> <li>VII <input checked="" type="checkbox"/> Certain defects in the international application</li> <li>VIII <input checked="" type="checkbox"/> Certain observations on the international application</li> </ul>				
Date of submission of the demand <b>20/08/1998</b>		Date of completion of this report <b>2. 05. 99</b>		
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. (+49-89) 2399-0 Tx: 523856 epmu d Fax: (+49-89) 2399-4465		Authorized officer <b>Okunowski, J</b> Telephone No. (+49-89) 2399 8975		





**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/NL98/00051

**I. Basis of the report**

1. This report has been drawn on the basis of (*substitute sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to the report since they do not contain amendments.*):

**Description, pages:**

1-6                      with telefax of                      05/05/1999

**Claims, No.:**

1-5                      with telefax of                      05/05/1999

**Drawings, sheets:**

1/3-3/3                      filed with the demand

2. The amendments have resulted in the cancellation of:

- ☐ the description,                      pages:  
☒ the claims,                      Nos.:                      6-13  
☐ the drawings,                      sheets:

3. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c));

4. Additional observations, if necessary:

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/NL98/00051

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims 1-5
	No: Claims
Inventive step (IS)	Yes: Claims
	No: Claims 1-5
Industrial applicability (IA)	Yes: Claims 1-5
	No: Claims

**2. Citations and explanations**

see separate sheet

**VI. Certain documents cited**

**1. Certain published documents (Rule 70.10)**

and / or

**2. Non-written disclosures (Rule 70.9)**

see separate sheet

**VII. Certain defects in the international application**

The following defects in the form or contents of the international application have been noted:

see separate sheet

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

see separate sheet

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

International application No. PCT/NL98/00051

Reference is made to the following documents:

D1: US-A-5 407 702

D2: WO 93/24324

**Item V**

1. None of the documents disclose the features of the present claims which relate to the starting-up phase of the process (the starting-up implies the necessary apparatus features in the apparatus of claim 3. The process of claim 1 will at a given time leave the starting-up phase, but a process also implies an apparatus on which the process is carried out, and this apparatus will then still show the features necessary to carry out the starting-up procedure). These features are, for claim 1:

- the features of part (iii) of claim 1;
- bringing the plastic strip and the substrate up to speed;
- the features of part (v) of claim 1.

Also, none of the documents on file explicitly discloses in-line or on-line thickness monitoring, colour monitoring, strip tension monitoring or width trimming, as defined in present claim 1.

Furthermore, as far as claim 3 is concerned, none of the prior art documents discloses the contact roll to be movable in the sense of present claim 3, a feature which is related to the starting-up features of present claim 1.

The subject-matter of the present claims is therefore considered to be novel (Article 33(2) PCT).

2. The disclosure of D2 (see e.g. Example 1) is considered to represent the closest prior art. In the general process description of D2, beginning on page 5, line 8, there is no explicit statement that the film is laminated onto the metal directly after extrusion and cooling. However, there is no mention at all in the description of the subject-matter of D2 of any intermediate step or intermediate storage, and the general description of D2 implicitly strongly suggests direct lamination after extrusion/cooling (see also page 11, lines 13 to 31). Processes with intermediate

*↳ individual.*

~~extrudate storage are mentioned in D2 only in the description of the prior art to~~  
D2, and such descriptions have no bearing on the teaching of D2 itself.

Claim 4 of D2, finally, discloses explicitly that the plastic film is laminated onto the metal sheet directly after extrusion.

D2 is therefore considered to disclose all features of present claims 1 and 3 except the above-mentioned features, which are considered to be the distinguishing features of present claims 1 and 3 over the closest prior art.

However, the problem to be solved in the present application is indicated to be (reference is made to the English translation of the Dutch original) to avoid delamination of plastic coating laminated onto a metal substrate, while at the same time avoiding polymer degradation caused by excessive exposure of the plastic coating to heat (see page 2, 2nd paragraph together with the preceding prior art discussion). The solution to these problems should evidently reside in the continuous (steady-state) part of the lamination process. The description of the present application seems to suggest that the solution is offered by heating the metal substrate prior to lamination of the cooled plastic material, but this feature is already known from D2.

There are at any rate no indications in the application as originally filed that the distinguishing features as identified above give rise to effects which might offer a solution to the problem. The distinguishing features of present claims 1 and 3 over the closest prior art can therefore not be seen to substantiate the involvement of an inventive step, and the subject-matter of these claims does therefore not comply with Article 33(3) PCT.

3. The additional features of present claim 5 is known from D1. The additional features of present claims 2 and 4 would, insofar as they are not already known from D1 or D2, not seem to be related to a solution to the problem as identified above.

The subject-matter of present claims 2, 4 and 5 would therefore not seem to involve an inventive step (Article 33(3) PCT).

**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT - SEPARATE SHEET**

---

International application No. PCT/NL98/00051

**Item VI**

Document WO 97/32715 has a filing date of 23/05/1996, which is before the presently claimed priority dates, and a publication date of 12/09/1997, which is before the present filing date, but after the presently claimed priority dates. Thus, depending upon the validity of the present priority claims, this document can be prior art under Rule 64.1 PCT or under Rule 64.3 PCT.

However, its disclosure seems to fall outside the scope of the present claims, and also not to teach more than can already be derived from the other cited documents. Its status would therefore at present not seem to be an issue of great importance.

**Item VII**

1. The independent claims have not been drafted in the two part form bearing reference to the closest prior art (Rule 6.3(b) PCT).
2. It would seem that the acknowledgement of D2 in the present description does not reflect D2's actual teaching (Rule 5.1(a)(ii) PCT).

**Item VIII**

The following objection is raised for lack of clarity of the claims (Article 6 PCT).

1. The definition "close to the softening temperature" as lower limit for the metal temperature is vague.

METHOD AND APPARATUS FOR STRIP-COATING A METALLIC STRIP-  
SHAPED SUBSTRATE WITH A PLASTIC STRIP AND STRIP THUS  
OBTAINED

The invention relates to a method for strip-coating a metallic strip-shaped substrate with a thin strip of plastic, an apparatus for carrying out the method as well as to the coated strip obtained with the method.

There are at least two methods known for manufacturing a coated product comprising a metal substrate and a plastic layer adhering to it, namely film-laminating and extrusion-coating.

In the case of film-laminating, a finished plastic film is unrolled and applied onto the metal substrate, as disclosed in e.g. WO 93/24324.

In the case of extrusion-coating a sheet of plastic is applied onto the metal substrate directly or virtually directly from an extruder, as disclosed in e.g. EP 0 067 060 A1.

In the case of the first method a roll of finished film is taken as starting material. A problem in making a roll of film is rolling it up. The film tends to stick to itself so that the windings cling to each other. Because in its rolled up state the film shrinks somewhat, the roll has to be rolled up loosely to enable it to be unrolled once again in a controlled way. Inevitable stresses in the film then easily cause edge build-up, the roll becomes unround, and the film displays spacing tracks when being unrolled. Among other things this makes the film incapable of being unrolled without difficulty at a sufficiently high speed; if this does succeed then there remains the problem that at higher rolling off speeds electrostatic discharge symptoms need to be reckoned with. To avoid such difficulties additives are added to for example household foils; in the case of film-lamination this solution offers

no remedy because the additives unacceptably reduce the capacity to adhere to the metal substrate.

On the face of it extrusion-coating would therefore seem an interesting alternative, and so it is for a small number of applications, namely those whereby the plastic involved has the correct adhesion properties in molten state. When this is no longer the case, or not adequately so, and molecules need to be incorporated in the plastic to migrate to the surface in order to accomplish adhesion, in the case of extrusion-coating the problems occur, at least where a high coating speed is desired. This is because adhesion groups only migrate fast enough, i.e. within tenths of a second, if a sufficiently high temperature can be maintained during the coating. This is only possible when coating onto one side of the substrate. The required high temperature then also makes it impossible subsequently to coat the other side because the previously applied coating becomes unacceptably damaged on the second exposure to the high temperature. Even non-subsequent but simultaneous two-sided extrusion-coating is no solution because in the case of extrusion-coating the slightest deviation in substrate thickness and the slightest disturbance in the process would cause unstable process operation and consequently coating differences and inhomogeneities on each side.

The problems surrounding the procedures outlined are resolved or at least largely reduced if worked in accordance with the invention.

The method in accordance with the invention is characterised in that it comprises in combination the stages

- (i) in-situ casting of a plastic strip;
- (ii) leading the plastic strip around a preferably internally water-cooled cooling roll;
- (iii) leading away the plastic strip until the plastic strip production is underway and

stabilised;

- (iv) bringing the plastic strip and the substrate up to speed and heating the substrate to a temperature of the substrate close to or above the softening temperature of the part of the plastic strip facing the substrate;
- (v) pressing the plastic strip onto the substrate and where applicable breaking off the plastic strip and stopping it being led away, while the substrate and the cooling roll are connected by the plastic strip;
- (vi) coating the substrate with the plastic strip at high speed.

This achieves the effect of enabling a considerably thinner plastic layer to be applied onto the metal strip in a controlled and economically viable manner.

It is remarked that US 5,407,702 discloses a method for coating a metal strip with a polymer extrudate which extrudate after extrusion is firstly brought into contact with a surface having a temperature which will promote sticking or clinging of the extrudate thereto. A typical temperature for this purpose is said to be in the range of about 120 °C to 180 °C.

The invention is also embodied in an apparatus for the continuous strip-coating of a metal substrate with a layer of plastic.

Finally the invention is further embodied in a strip-coated packaging steel.

The invention will now be further illustrated by reference to the drawing comprising Figures 1, 2 and 3 each of which show a possible line drawing for coating in accordance with the invention, and several non-limitative examples with references to the Figures.

#### Example 1

An ECCS substrate (1) (also known as TFS) with a thickness of 0.20 mm. This



substrate is heated to a temperature of 230 °C by means of heating (2), for example comprising heated guide rolls and/or on the basis of induction, hot air or otherwise. A plastic strip (3) such as a PET plastic strip is produced by applying on each side of substrate (1) molten PET via nozzle (4), (4a) on an internally water-cooled guide roll (5), (5a). The cooled PET strip (3) is then conveyed to the rubber coated contact roll (6). As it travels it is possible to monitor the thickness, colour and strip tension and to trim to the correct width. The thickness of the two strips (3) is between 3 and 100  $\mu\text{m}$ . Prior to commencement of coating the contact rolls (6) do not touch substrate (1), and the two strips are conveyed off, for example rolled up on winders (7).

In order to begin coating, contact rolls (6) are closed, i.e. moved towards substrate (1).

PET strips (3) adhere to substrate (1) and almost simultaneously the pieces of strip (3) between contact roll (6) and winder (7) are cut through. The rubber of rolls (6) is cooled externally, for example by metal cooling roll (8), or by an air-blade on the rubber surface. The coated strip is then subjected to a brief extra heat treatment to 260 °C in order to optimise adhesion. A good product results, particularly suitable for example for the covers of three-piece cans.

#### Example 2

As in Example 1 but now on the one side of substrate (1) the plastic flowing from nozzle (4a) is a two-layer polypropylene, whereby one of the layers, the adhesion layer, is maleic acid anhydride modified polypropylene; on the other side of the substrate a PET strip is manufactured and supplied via nozzle (4) and cooling roll (5). In this case the preheating temperature of substrate (1) is 200 °C. The thickness of the two strips is between 3 and 100  $\mu\text{m}$ . During the initial contact of the two-layer strip with the substrate

AMENDED SHEET

at 200 °C, a temperature above the melting temperature of polypropylene, there is already some adhesion onto substrate (1), while the polypropylene top layer neither sticks to or is damaged by the rubber of contact roll (6) that has a temperature of approx. 90 °C. This adhesion to substrate (1) attains its maximum after approx. 1 second. The coated strip is then subjected to a brief extra heat treatment, for example to 260 °C, in order to optimise the adhesion of both PET and modified PP. A product results, for example particularly suitable for beer bottle crown closures.

### Example 3

As in example 1 but now both plastic strips are two-layer polypropylene. Substrate (1) is 0.10 mm thick ECCS and is heated to a temperature of 230 °C. Now a product results with a PP layer on both sides. The higher temperature than in example 2 is necessary because of the low heat content of thin substrate. The product is particularly suitable for example for animal food packaging.

Figures 1, 2 and 3 show different line drawings in accordance with the invention of coating a metal substrate with an in-line manufactured plastic strip. Fig. 2 shows a vacuum chamber (20), an electrostatic edge limiter (9), an air-blade (10) for cooling, a thickness gauge (11), an edging knife (12), a cutting waste extractor installation (13), a temperature gauge (14) and a furnace (15) for heating the coated strip.

It is possible to stretch the plastic strip at a temperature above the glass transition temperature and below the softening temperature of the plastic; in the case of uni-axial stretching an elongation of up to 400% is conceivable. If desired it is possible to provide the plastic strip with openings.

To the expert it will be clear that the invention can be applied for single-side or two-side coating of a metallic substrate with on each side the same plastic, or a different

plastic for example PET or polypropylene or on one side polypropylene and on the other side PET.

---

AMENDED SHEET

CLAIMS

1. Method for strip-coating a metallic strip-shaped substrate with a strip of plastic comprising the successive stages
  - (i) in-situ casting of a plastic strip;
  - (ii) leading the plastic strip around a preferably internally water-cooled cooling roll;
  - (iii) leading away the plastic strip between an opened contact roll and the substrate until the plastic strip production is underway and stabilised;
  - (iv) bringing the plastic strip and the substrate up to speed and heating the substrate to a temperature of the substrate close to or above the softening temperature of the part of the plastic strip facing the substrate;
  - (v) pressing the plastic strip onto the substrate by closing the contact roll and where applicable breaking off the plastic strip and stopping it being led away, while the substrate and the cooling roll are connected by the plastic strip;
  - (vi) coating the substrate with the plastic strip at high speed;while performing on the plastic strip as it travels between cooling roll and contact roll at least one of monitoring its thickness, monitoring its colour, monitoring strip tension and trimming its width.
2. Method in accordance with Claim 1, characterised in that after the plastic strip has been applied an extra heat treatment stage follows in order to improve adhesion.
3. Apparatus for strip-coating a metallic strip-shaped substrate with a strip of plastic

in accordance with claim 1, comprising in combination:

- means of conveying the metal substrate;
- a contact roll for pressing the plastic strip onto the substrate;
- means of casting for casting the plastic;
- a cooling roll for the formation of a plastic strip;
- means of feeding and guiding for bringing the plastic strip to the substrate via the contact roll;

wherein the contact roll is movable to a first position apart from the substrate wherein it is suitably arranged to co-operate with a means of conveying off the plastic strip and to a second position relative to the substrate wherein it is suitable to press the plastic strip onto the substrate.

4. Apparatus in accordance with Claim 3, characterised in that the contact roll is rubber at least on a surface with which it comes into contact with the plastic strip.
5. Apparatus in accordance with Claims 3 or 4, characterised in that the means of conveying substrate, the contact roll, the means of casting, the cooling roll and the means of feeding and guiding are essentially duplicated, one set on each side of where the substrate is situated during operation for simultaneously two-sided coating the substrate.

PCT

20. 02. 98

## REQUEST

The undersigned requests that the present international application be processed according to the Patent Cooperation Treaty.

For receiving Office use only

PCT/NL 98 / 00051

International Application No.

23 JAN 1998

(23. 01. 98)

International Filing Date

BUREAU VOOR DE INDUSTRIËLE EIGENDOM  
P.C.T. INTERNATIONAL APPLICATION

Name of receiving Office and "PCT International Application"

Applicant's or agent's file reference

(if desired) (12 characters maximum)

H0888PCT/HdGZR

## Box No. I TITLE OF INVENTION

Method and apparatus for strip-coating a metallic strip-shaped substrate with a plastic band and strip thus obtained

## Box No. II APPLICANT

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)

Hoogovens Staal BV  
P.O. Box 10000  
1970 CA IJMUIDEN  
The Netherlands

☐ This person is also inventor.

Telephone No.

+31 251 491812

Facsimile No.

+31 251 470252

Teleprinter No.

35211 hovs nl

State (i.e. country) of nationality:

The Netherlands

State (i.e. country) of residence:

The Netherlands

This person is applicant  
for the purposes of:

☐ all designated  
States

☒ all designated States except  
the United States of America

☐ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

## Box No. III FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)

Beentjes, Petrus Cornelis Jozef  
Cieweg 43  
1902 AA CASTRICUM  
The Netherlands

This person is:

☐ applicant only

☒ applicant and inventor

☐ inventor only (If this check-box  
is marked, do not fill in below.)

State (i.e. country) of nationality:

The Netherlands

State (i.e. country) of residence:

The Netherlands

This person is applicant  
for the purposes of:

☐ all designated  
States

☐ all designated States except  
the United States of America

☒ the United States  
of America only

☐ the States indicated in  
the Supplemental Box

☐ Further applicants and/or (further) inventors are indicated on a continuation sheet.

## Box No. IV AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE

The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:

☒ agent

☐ common representative

Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)

Herman de Groot, Johan Willem  
Hoogovens Corporate Services BV  
P.O. Box 10000  
1970 CA IJMUIDEN  
The Netherlands

Telephone No.

+ 31 251 491812

Facsimile No.

+ 31 251 470252

Teleprinter No.

35211 hovs nl

☐ Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.

**Box No.V DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

**Regional Patent**

- ☒ **AP ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting State of the Harare Protocol and of the PCT
- ☒ **EA Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakhstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is a Contracting State of the European Patent Convention and of the PCT
- ☒ **OA OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is a member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line)

**National Patent (if other kind of protection or treatment desired, specify on dotted line):**

- |   |   |
|---|---|
| <input checked="" type="checkbox"/> <b>AL</b> Albania                               | <input checked="" type="checkbox"/> <b>LT</b> Lithuania                                 |
| <input checked="" type="checkbox"/> <b>AM</b> Armenia                               | <input checked="" type="checkbox"/> <b>LU</b> Luxembourg                                |
| <input checked="" type="checkbox"/> <b>AT</b> Austria                               | <input checked="" type="checkbox"/> <b>LV</b> Latvia                                    |
| <input checked="" type="checkbox"/> <b>AU</b> Australia                             | <input checked="" type="checkbox"/> <b>MD</b> Republic of Moldova                       |
| <input checked="" type="checkbox"/> <b>AZ</b> Azerbaijan                            | <input checked="" type="checkbox"/> <b>MG</b> Madagascar                                |
| <input checked="" type="checkbox"/> <b>BA</b> Bosnia and Herzegovina                | <input checked="" type="checkbox"/> <b>MK</b> The former Yugoslav Republic of Macedonia |
| <input checked="" type="checkbox"/> <b>BB</b> Barbados                              | <input checked="" type="checkbox"/> <b>MN</b> Mongolia                                  |
| <input checked="" type="checkbox"/> <b>BG</b> Bulgaria                              | <input checked="" type="checkbox"/> <b>MW</b> Malawi                                    |
| <input checked="" type="checkbox"/> <b>BR</b> Brazil                                | <input checked="" type="checkbox"/> <b>MX</b> Mexico                                    |
| <input checked="" type="checkbox"/> <b>BY</b> Belarus                               | <input checked="" type="checkbox"/> <b>NO</b> Norway                                    |
| <input checked="" type="checkbox"/> <b>CA</b> Canada                                | <input checked="" type="checkbox"/> <b>NZ</b> New Zealand                               |
| <input checked="" type="checkbox"/> <b>CH and LI</b> Switzerland and Liechtenstein  | <input checked="" type="checkbox"/> <b>PL</b> Poland                                    |
| <input checked="" type="checkbox"/> <b>CN</b> China                                 | <input checked="" type="checkbox"/> <b>PT</b> Portugal                                  |
| <input checked="" type="checkbox"/> <b>CU</b> Cuba                                  | <input checked="" type="checkbox"/> <b>RO</b> Romania                                   |
| <input checked="" type="checkbox"/> <b>CZ</b> Czech Republic                        | <input checked="" type="checkbox"/> <b>RU</b> Russian Federation                        |
| <input checked="" type="checkbox"/> <b>DE</b> Germany                               | <input checked="" type="checkbox"/> <b>SD</b> Sudan                                     |
| <input checked="" type="checkbox"/> <b>DK</b> Denmark                               | <input checked="" type="checkbox"/> <b>SE</b> Sweden                                    |
| <input checked="" type="checkbox"/> <b>EE</b> Estonia                               | <input checked="" type="checkbox"/> <b>SG</b> Singapore                                 |
| <input checked="" type="checkbox"/> <b>ES</b> Spain                                 | <input checked="" type="checkbox"/> <b>SI</b> Slovenia                                  |
| <input checked="" type="checkbox"/> <b>FI</b> Finland                               | <input checked="" type="checkbox"/> <b>SK</b> Slovakia                                  |
| <input checked="" type="checkbox"/> <b>GB</b> United Kingdom                        | <input checked="" type="checkbox"/> <b>SL</b> Sierra Leone                              |
| <input checked="" type="checkbox"/> <b>GE</b> Georgia                               | <input checked="" type="checkbox"/> <b>TJ</b> Tajikistan                                |
| <input checked="" type="checkbox"/> <b>GH</b> Ghana                                 | <input checked="" type="checkbox"/> <b>TM</b> Turkmenistan                              |
| <input checked="" type="checkbox"/> <b>GM</b> Gambia                                | <input checked="" type="checkbox"/> <b>TR</b> Turkey                                    |
| <input checked="" type="checkbox"/> <b>GW</b> Guinea-Bissau                         | <input checked="" type="checkbox"/> <b>TT</b> Trinidad and Tobago                       |
| <input checked="" type="checkbox"/> <b>HU</b> Hungary                               | <input checked="" type="checkbox"/> <b>UA</b> Ukraine                                   |
| <input checked="" type="checkbox"/> <b>ID</b> Indonesia                             | <input checked="" type="checkbox"/> <b>UG</b> Uganda                                    |
| <input checked="" type="checkbox"/> <b>IL</b> Israel                                | <input checked="" type="checkbox"/> <b>US</b> United States of America                  |
| <input checked="" type="checkbox"/> <b>IS</b> Iceland                               | <input checked="" type="checkbox"/> <b>UZ</b> Uzbekistan                                |
| <input checked="" type="checkbox"/> <b>JP</b> Japan                                 | <input checked="" type="checkbox"/> <b>VN</b> Viet Nam                                  |
| <input checked="" type="checkbox"/> <b>KE</b> Kenya                                 | <input checked="" type="checkbox"/> <b>YU</b> Yugoslavia                                |
| <input checked="" type="checkbox"/> <b>KG</b> Kyrgyzstan                            | <input checked="" type="checkbox"/> <b>ZW</b> Zimbabwe                                  |
| <input checked="" type="checkbox"/> <b>KP</b> Democratic People's Republic of Korea |   |
| <input checked="" type="checkbox"/> <b>KR</b> Republic of Korea                     |   |
| <input checked="" type="checkbox"/> <b>KZ</b> Kazakhstan                            |   |
| <input checked="" type="checkbox"/> <b>LC</b> Saint Lucia                           |   |
| <input checked="" type="checkbox"/> <b>LK</b> Sri Lanka                             |   |
| <input checked="" type="checkbox"/> <b>LR</b> Liberia                               |   |
| <input checked="" type="checkbox"/> <b>LS</b> Lesotho                               |   |

Check-boxes reserved for designating States (for the purposes of a national patent) which have become party to the PCT after issuance of this sheet:

- ☐ .....
- ☐ .....
- ☐ .....

In addition to the designations made above, the applicant also makes under Rule 4.9(b) all designations which would be permitted under the PCT except the designation(s) of .....

The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

**Box N . VI PRIORITY CLAIM**Further priority claims are indicated in the Supplemental Box ☐

The priority of the following earlier application(s) is hereby claimed:

Country (in which, or for which, the application was filed)	Filing Date (day/month/year)	Application No.	Office of filing (only for regional or international application)
item (1) NL	18 February 1997 (18-02-1997)	1005304	
item (2) NL	23 January 1997 (23-01-1997)	1005066	
item (3)			

Mark the following check-box if the certified copy of the earlier application is to be issued by the Office which for the purposes of the present international application is the receiving Office (a fee may be required):

☒ The receiving Office is hereby requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) identified above as item(s): 1 and 2.
**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**Choice of International Searching Authority (ISA) (If two or more International Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used): ISA / EP

Earlier search Fill in where a search (international, international-type or other) by the International Searching Authority has already been carried out or requested and the Authority is now requested to base the international search, to the extent possible, on the results of that earlier search. Identify such search or request either by reference to the relevant application (or the translation thereof) or by reference to the search request.

Country (or regional Office): EPO Date (day/month/year): 10-10-1997 Number: NL-1005304
**Box No. VIII CHECK LIST**

This international application contains the following number of sheets:

1. request : 3 sheets  
 2. description : 5 sheets  
 3. claims : 3 sheets  
 4. abstract : 1 sheets  
 5. drawings : 3 sheets

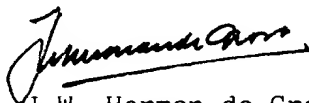
Total : 15 sheets

This international application is accompanied by the item(s) marked below:

1. ☐ separate signed power of attorney  
 2. ☐ copy of general power of attorney  
 3. ☐ statement explaining lack of signature  
 4. ☐ priority document(s) identified in Box No. VI as item(s):  
 5. ☒ fee calculation sheet  
 6. ☐ separate indications concerning deposited microorganisms  
 7. ☐ nucleotide and/or amino acid sequence listing (diskette)  
 8. ☐ other (specify):

Figure No. 1 of the drawings (if any) should accompany the abstract when it is published.**Box No. IX SIGNATURE OF APPLICANT OR AGENT**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



ir. J.W. Herman de Groot, Patent Counsel

For receiving Office use only

1. Date of actual receipt of the purported international application: <b>23 JAN 1998</b> (23. 01. 98)	2. Drawings: <input checked="" type="checkbox"/> received:  <input type="checkbox"/> not received:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:	
4. Date of timely receipt of the required corrections under PCT Article 11(2):	
5. International Searching Authority specified by the applicant: <u>ISA /</u>	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid

For International Bureau use only

Date of receipt of the record copy by the International Bureau: **10 FEBRUARY 1998** (10. 02. 98)



WERKWIJZE EN INRICHTING VOOR BANDBEKLEDEN VAN EEN  
METALLISCH BANDVORMIG SUBSTRAAT MET EEN KUNSTSTOFBAAN EN  
ALDUS VERKREGEN BAND

De uitvinding heeft betrekking op een werkwijze voor  
bandbekleden van een metallisch bandvormig substraat met  
een dunne baan kunststof, een inrichting voor het  
uitvoeren van de werkwijze alsmede op een met de werkwijze  
5 verkregen beklede band.

Er zijn althans twee werkwijzen bekend om een bekleed  
product omvattende een metalen substraat en een daaraan-  
gehechte kunststoflaag te vervaardigen, te weten  
filmlamineren en extrusiebekleden.

10 Bij filmlamineren wordt een gerede kunststoffilm  
afgerold en tegen het metalen substraat aangebracht.

Bij extrusiebekleden wordt een kunststofvel direct of  
vrijwel direct vanuit een extruder op het metalen  
substraat aangebracht.

15 Bij de eerste methode gaat men uit van een rol gerede  
film. Een probleem bij het maken van een rol film is het  
oprollen. De film heeft de neiging aan zichzelf te kleven  
zodat de wikkels aan elkaar komen te zitten. Doordat de  
film bovendien in de opgerolde toestand enigszins krimpt  
20 moet de rol om deze weer beheerst te kunnen afrollen,  
losjes opgewikkeld worden. Door onvermijdelijke spanningen  
in de film treedt dan al snel randopbouw op, wordt de rol  
onrond en vertoont de film bij afwikkelen ruimtebanen. Een  
en ander heeft onder andere tot gevolg dat de film niet  
25 met een voldoende hoge snelheid probleemloos kan worden  
afgerold; indien dit toch zou gelukken is daar nog het  
probleem dat bij hogere afrolsnelheden met  
elektrostatische ontladingsverschijnselen moet worden  
gerekend. Ter vermijding van dergelijke problemen worden  
30 aan bijvoorbeeld huishoudfolies bepaalde additieven  
toegevoegd; deze oplossing biedt bij filmlamineren geen  
soelaas omdat de additieven het vermogen aan het metalen  
substraat te hechten ontoelaatbaar verminderen.

Op het eerste gezicht lijkt dan het extrusiebekleden een interessant alternatief, en dat is het ook voor een beperkt aantal toepassingen namelijk die waarbij de betreffende kunststof in gesmolten toestand de juiste

5 ~~hechtende eigenschappen heeft. Zodra dat niet - of in~~  
onvoldoende mate - het geval is en er in de kunststof moleculen moeten worden ingebouwd die naar het oppervlak migreren om hechting te bewerkstelligen ontstaan bij extrusiebekleden - althans als een hoge bekledingssnelheid

10 gewenst is - de problemen. De migratie van hechtgroepen gaat namelijk alleen snel genoeg, i.e. binnen tienden van seconden, indien bij het bekleden een voldoende hoge temperatuur kan worden aangehouden. Dit is slechts bij bekleding aan één zijde van het substraat mogelijk. De

15 vereiste hoge temperatuur maakt het dan immers onmogelijk vervolgens de andere kant te bekleden aangezien de eerder aangebrachte bekleding bij tweede blootstelling aan de hoge temperatuur ontoelaatbaar beschadigt. Ook het niet volgtijdig maar gelijktijdig tweezijdig extrusiebekleden

20 biedt geen oplossing omdat de geringste substraatdikte-afwijking en de geringste procesverstoring bij het extrusiebekleden een instabiele bedrijfsvoering en dus aan weerszijden bekledingsverschillen en -inhomogeniteiten zouden veroorzaken.

25 De problemen die aan de geschetste procedures kleven worden opgelost althans verregaand teruggebracht indien volgens de uitvinding te werk wordt gegaan.

De werkwijze volgens de uitvinding is erdoor gekenmerkt dat deze in combinatie omvat de stappen

- 30 (i) in situ gieten van een kunststofbaan;  
(ii) voeren van de kunststofbaan over een koelrol;  
(iii) wegvoeren van de kunststofbaan totdat de kunststofbaanproductie op gang gekomen is en gestabiliseerd is;
- 35 (iv) op snelheid brengen van de kunststofbaan en het substraat en op een temperatuur brengen van het substraat welke temperatuur gelegen is in de buurt

van de verwekingstemperatuur van het naar het substraat gekeerde gedeelte van de kunststofbaan of daarboven;

(v) aandrukken van de kunststofbaan tegen het substraat  
5 en waar toepasselijk verbreken van de kunststofbaan en beëindigen van het wegvoeren ervan;

(vi) met hoge snelheid bekleden van het substraat met de kunststofbaan.

Hiermede is bereikt dat op beheerste en economisch  
10 rendabele wijze een aanzienlijk dunnere kunststoflaag op metaalband aan te brengen is.

De uitvinding is tevens belichaamd in een inrichting voor het continu bandbekleden van een metalen substraat met een kunststoflaag.

15 De uitvinding is tenslotte voorts belichaamd in een bandbekleed verpakingsstaal.

De uitvinding zal nu nader worden toegelicht aan de hand van de tekening omvattende figuren 1, 2 en 3 die elk een mogelijk lijnschema voor bekleden volgens de  
20 uitvinding tonen, en enkele niet beperkende voorbeelden onder verwijzing naar de figuren.

#### Voorbeeld 1

Een ECCS-substraat 1 (ook wel TFS genoemd) met een dikte van 0,20 mm. Dit substraat is op een temperatuur van  
25 230 °C gebracht, met behulp van verwarmingsmiddelen 2, bijvoorbeeld omvattende verwarmde geleide rollen en/of op basis van, inductie, hete lucht of anderszins. Aan beide zijden van het substraat 1 wordt een kunststofbaan 3 zoals een PET-kunststofbaan geproduceerd door gesmolten PET via  
30 spuitkop 4, 4a op een intern watergekoelde gietrol 5, 5a te brengen. De afgekoelde PET-baan 3 wordt vervolgens naar de met rubber beklede aandrukrol 6 getransporteerd. Tijdens dit transport is diktemeting, kleurmeting, controle van de bandtrek en op de juiste breedte trimmen  
35 mogelijk. De dikte van beide banen 3 bedraagt tussen de 3 en 100 mm. Vóór aanvang van het bekleden raken de aandrukrollen 6 het substraat 1 niet, en worden beide

banen afgevoerd, bijvoorbeeld opgerold op oprollers 7.

Om met bekleden te beginnen worden de aandrukrollen 6 gesloten, i.e. naar het substraat 1 bewogen.

PET-banen 3 hechten zich aan het substraat 1 en  
5 ongeveer gelijktijdig worden de stukken baan 3 tussen  
aandrukrol 6 en oproller 7 doorgeknipt. Het rubber van de  
rollen 6 wordt extern gekoeld, bijvoorbeeld met een  
metalen koelrol 8, of met een luchtmes op het  
rubberoppervlak. De beklede band wordt vervolgens aan een  
10 korte extra warmtebehandeling onderworpen tot 260 °C ter  
optimalisatie van de hechting. Er ontstaat een goed  
product, bijvoorbeeld in het bijzonder geschikt voor  
deksels voor driedelige bussen.

#### Voorbeeld 2

15 Als in voorbeeld 1 maar nu is aan één zijde van het  
substraat 1 de uit spuitmond 4a stromende kunststof een  
tweelaags polypropreen, waarbij één der lagen, de  
hechtlaag, maleïnezuuranhydride gemodificeerd polypropreen  
is; aan de andere zijde van het substraat wordt via  
20 spuitmond 4 en koelrol 5 een PET baan vervaardigd en  
aangevoerd. De voorverwarmtemperatuur van het substraat 1  
bedraagt in dit geval 200 °C. De dikte van beide banen  
bedraagt tussen de 3 en de 100 mm. Tijdens het eerste  
contact van de tweelaags baan met het substraat van 200  
25 °C, een temperatuur boven de smelttemperatuur van poly-  
propreen, ontstaat al enige hechting aan het substraat 1,  
terwijl de polypropreen toplaag noch verkleeft met noch  
beschadigd wordt door het rubber van de aandrukrol 6, dat  
een temperatuur heeft van ca. 90 °C. Na ca. 1 seconde is  
30 deze hechting aan het substraat 1 maximaal geworden. De  
beklede band wordt vervolgens aan een korte extra  
warmtebehandeling onderworpen, bijvoorbeeld tot 260 °C ter  
optimalisatie van de hechting van zowel PET als  
gemodificeerd PP. Er ontstaat een product, bijvoorbeeld in  
35 het bijzonder geschikt voor kroonkurken van bierflesjes.

#### Voorbeeld 3

Als in voorbeeld 1 maar nu zijn beide kunststofbanen

van tweelaags polypropreen. Het substraat 1 is 0,10 mm dik ECCS en wordt op een temperatuur van 230 °C gebracht. Nu ontstaat een product met aan beide zijden een PP-laag. De hogere temperatuur dan in voorbeeld 2 is nodig omdat de  
5 ~~warmte-inhoud van dun substraat gering is.~~ Het product is bijvoorbeeld in het bijzonder geschikt voor diervoeder-verpakkingen.

In de figuren 1, 2 en 3 zijn verschillende lijnschema's getoond volgens de uitvinding met een in-line  
10 vervaardigde kunststofbaan bekleden van een metalen substraat. In fig. 2 is 20 een vacuüm kamer, 9 een elektrostatische randbegrenzer, 10 een luchtmes voor koeling, 11 een diktemeter, 12 een kantmes, 13 een snijafvalafzuiginstallatie, 14 een temperatuurmeter en 15  
15 een oven voor verwarming van de beklede band.

Het is mogelijk de kunststofbaan te verstrekken bij een temperatuur gelegen boven de glastemperatuur en onder de verwekingstemperatuur van de kunststof; bij uni-axiale verstrekking is een rek van tot 400 % denkbaar. Indien  
20 gewenst is het mogelijk de kunststofbaan van uitsparingen te voorzien.

Het zal voor de deskundige duidelijk zijn dat de uitvinding toegepast kan worden bij eenzijdig of tweezijdig bekleden van een metallisch substraat met aan  
25 beide zijden dezelfde kunststof of aan beide zijden een verschillende kunststof bijvoorbeeld PET of polypropyleen of aan één zijde polypropyleen en de andere zijde PET.

## CONCLUSIES

1. Werkwijze voor bandbekleden van een metallisch bandvormig substraat met een kunststofbaan omvattende de stappen
- 
- (i) in situ gieten van een kunststofbaan;
- (ii) voeren van de kunststofbaan over een koelrol;
- (iii) wegvoeren van de kunststofbaan totdat de kunststofbaanproductie op gang gekomen is en gestabiliseerd is;
- (iv) op snelheid brengen van de kunststofbaan en het substraat en op een temperatuur brengen van het substraat welke temperatuur gelegen is in de buurt van de verwekingstemperatuur van het naar het substraat gekeerde gedeelte van de kunststofbaan of daarboven;
- (v) aandrukken van de kunststofbaan tegen het substraat en waar toepasselijk verbreken van de kunststofbaan en beëindigen van het wegvoeren ervan;
- (vi) met hoge snelheid bekleden van het substraat met de kunststofbaan.
2. Werkwijze volgens conclusie 1, met het kenmerk, dat na het aanbrengen van de kunststofbaan nog een extra verwarmingsstap volgt ter verbetering van de hechting.
3. Inrichting voor bandbekleden van een metallisch bandvormig substraat met een kunststofbaan, omvattende in combinatie:
- substraattransportmiddelen voor transport van metallisch substraat;
  - een aandrukrol voor het aandrukken van de kunststofbaan op het substraat;
  - gietmiddelen voor het gieten van de kunststof;
  - een koelrol voor het doen vormen van een

kunststofbaan;

- aanvoer- en geleidemiddelen voor het via de aandrukrol naar het substraat brengen van de kunststofbaan.

5

4. Inrichting volgens conclusie 3, met het kenmerk, dat de aandrukrol althans aan een oppervlak waarmede deze tijdens bedrijf in contact komt met de kunststofbaan van rubber is.  
10
5. Inrichting volgens conclusie 3 of 4, met het kenmerk, dat de substraattransportmiddelen, de aandrukrol, de gietmiddelen, de koelrol en de aanvoer- en geleidemiddelen in hoofdzaak in tweevoud omvat en elk  
15 enkelvoud aan weerszijden van waar zich tijdens bedrijf het substraat bevindt, voor het gelijktijdig tweezijdig bekleden van het substraat.
6. Van een organische hechtende laag voorziene  
20 metaalband, met het kenmerk, dat de organische laag in hoofdzaak amorf PET omvat.
7. Band volgens conclusie 6, waarbij de organische laag een dikte heeft van minder dan 20 m.  
25
8. Band volgens conclusie 6 of 7, waarbij de organische laag een dikte heeft van minder dan 15 m.
9. Band volgens conclusie 6, 7 of 8 waarbij de  
30 organische laag een dikte heeft van minder dan 10 m.
10. Band volgens conclusie 6, 7, 8 of 9 waarbij de organische laag een dikte heeft van minder dan 5 m.
- 35 11. Band volgens een der conclusies 6-10, waarbij ten minste één laag uit twee of meer lagen kunststof bestaat met als toplaag een door kleurstoffen

9

## UITTREKSEL

Werkwijze voor bandbekleden van een metallisch bandvormig substraat met een kunststofbaan omvattende de stappen

- (i) in situ gieten van een kunststofbaan;
- (ii) voeren van de kunststofbaan over een koelrol;
- (iii) wegvoeren van de kunststofbaan totdat de kunststofbaanproductie op gang gekomen is en gestabiliseerd is;
- (iv) op snelheid brengen van de kunststofbaan en het substraat en op een temperatuur brengen van het substraat welke temperatuur gelegen is in de buurt van de verwekingstemperatuur van het naar het substraat gekeerde gedeelte van de kunststofbaan;
- (v) aandrukken van de kunststofbaan tegen het substraat en waar toepasselijk verbreken van de kunststofbaan en beëindigen van het wegvoeren ervan;
- (vi) met hoge snelheid bekleden van het substraat met de kunststofbaan.



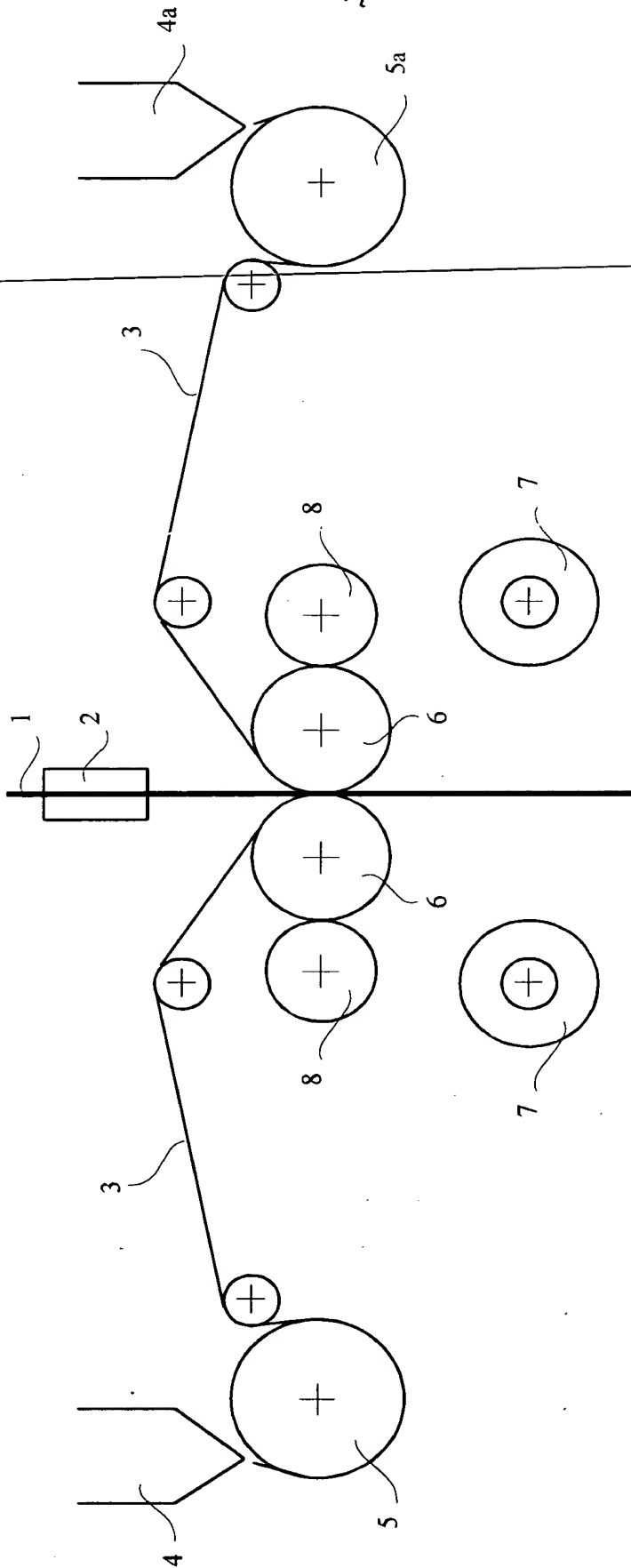


Fig.1

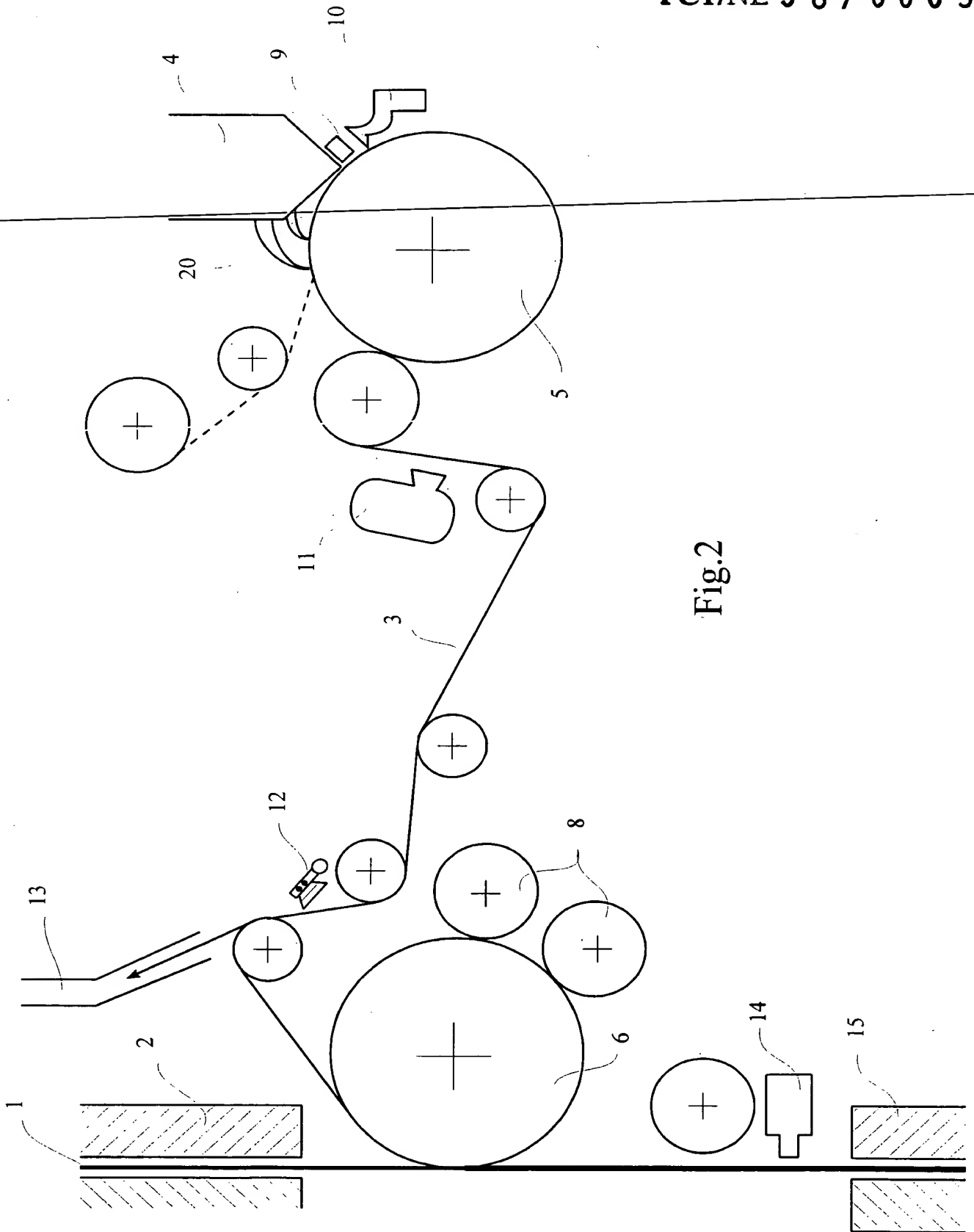


Fig.2

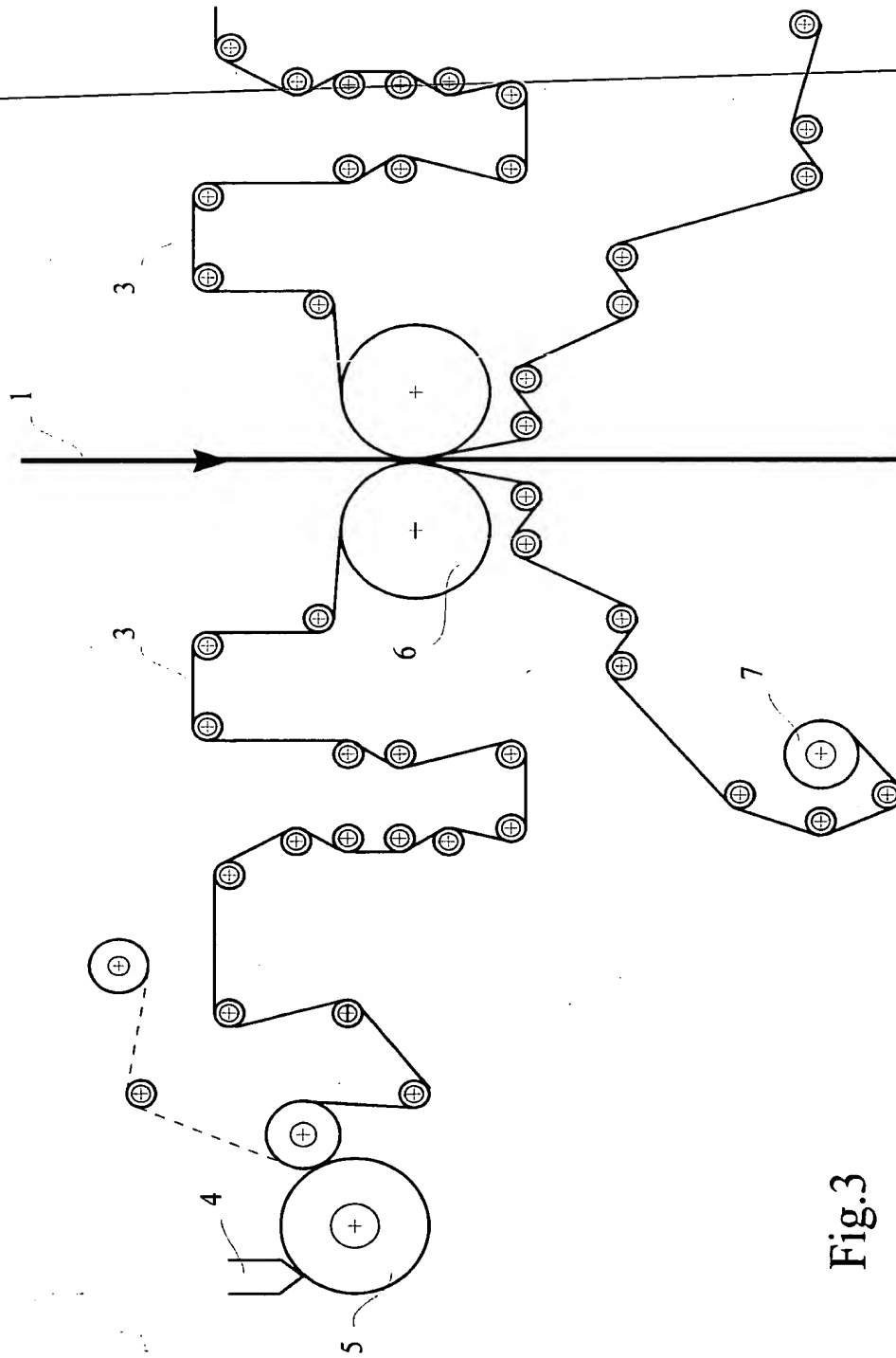


Fig.3